

CLAIMS

We claim:

- [c1] 1. A method for finishing a surface of a protective package on a microelectronic device, comprising:
abrading at least a portion of the surface of the package by engaging an abrasive media with the surface of the package; and
stopping the abrasion when a surface blemish has been at least partially removed from the package.
- [c2] 2. The method of claim 1 wherein the abrasive media is a fixed-abrasive member and abrading the surface of the package comprises pressing the surface of the package against the fixed-abrasive member and imparting motion to the package and/or the member to rub the package surface against the member.
- [c3] 3. The method of claim 2 wherein the fixed-abrasive member is a fixed-abrasive pad having a wet/dry media with a grit of 120 – 1200.
- [c4] 4. The method of claim 1 wherein the abrasive media is a fixed-abrasive member and a solution, and abrading the surface of the package comprises pressing the surface of the package against the fixed-abrasive member in the presence of the solution and imparting motion to the package and/or the fixed-abrasive member to rub the package surface against the fixed-abrasive member in the presence of the solution.
- [c5] 5. The method of claim 4 wherein the fixed-abrasive member is a fixed-abrasive pad having a grit of 120-1200, and the solution is a clean solution comprising water.

[c6] 6. The method of claim 1 wherein the abrasive media is a non-abrasive member and a chemical solution having abrasive particles, and abrading the surface of the package comprises pressing the surface of the package against the non-abrasive member in the presence of the solution and imparting motion to the package and/or the non-abrasive member to rub the package surface against the member in the presence of the solution.

[c7] 7. The method of claim 6 wherein the non-abrasive member is a non-abrasive pad comprising polyurethane, and the abrasive particles in the chemical solution are comprised of one or more of ceria, alumina, or silica.

[c8] 8. The method of claim 1 wherein the abrasive media is an abrasive blasting media and abrading the surface of the package comprises driving the abrasive blasting media against the surface of the package.

[c9] 9. The method of claim 8 wherein the abrasive blasting media is comprised of one or more of a walnut media, a polymeric media, or an aluminum oxide media.

[c10] 10. The method of claim 1 wherein stopping the abrasion when a surface blemish has been at least partially removed includes stopping the abrasion when a depth of .001 - .010 inch of material has been removed from at least a portion of the package.

[c11] 11. The method of claim 1, further comprising cleaning residual materials from the package after stopping the abrasion of the package surface.

[c12] 12. The method of claim 1 wherein the package surface to be finished is positioned adjacent to an interposing substrate assembly, and wherein the method further comprises positioning a masking member at least adjacent to a

portion of the interposing substrate assembly such that the portion of the package surface to be abraded is not covered by the masking member.

[c13] 13. A method for finishing a molded surface of a protective resin package on a microelectronic device, comprising:

abrading at least a portion of the molded resin surface of the package by pressing the surface of the package against an abrasive media and imparting motion to the package and/or the abrasive media to rub the package surface against the abrasive media and remove a portion of the package; and

cleaning residual materials from at least a portion of the package after terminating the abrasion of the molded resin surface.

[c14] 14. The method of claim 13, further comprising:

controlling the depth of the abrasion by determining a depth at which the abrasion will have removed sufficient blemishes in the surface to attain a preselected surface finish and terminating the abrasion at the depth where the preselected surface finish has been attained.

[c15] 15. The method of claim 13 wherein the molded surface to be finished is a primary marking surface of the microelectronic device package, and abrading the molded surface comprises engaging the primary marking surface with the abrasive media.

[c16] 16. The method of claim 13 wherein cleaning residual materials from the package further comprises cleaning at least a portion of the package with de-ionized water and a polyvinyl chloride brush.

[c17] 17. The method of claim 13 wherein the abrasive media is a fixed-abrasive member, and abrading the molded surface comprises engaging the molded surface with the fixed-abrasive member.

[c18] 18. The method of claim 13 wherein the abrasive media is a fixed-abrasive member and a solution, and abrading the surface of the package comprises pressing the surface of the package against the fixed-abrasive member in the presence of the solution and imparting motion to the package and/or the fixed-abrasive member to rub the package surface against the fixed-abrasive member in the presence of the solution.

[c19] 19. The method of claim 13 wherein the abrasive media is a non-abrasive member and a chemical solution having abrasive particles, and abrading the surface of the package comprises pressing the surface of the package against the non-abrasive member in the presence of the solution and imparting motion to the package and/or the non-abrasive member to rub the package surface against the non-abrasive member in the presence of the solution.

[c20] 20. The method of claim 13 wherein the abrasive media is an abrasive blasting media and abrading the molded surface comprises engaging the molded surface with the abrasive blasting media.

[c21] 21. The method of claim 13 wherein the molded surface to be finished is positioned adjacent to an interposing substrate assembly, and wherein the method further comprises positioning a masking member at least adjacent to a portion of the interposing substrate assembly such that the portion of the package surface to be abraded is not covered by the masking member.

- [c22] 22. A method for finishing a surface of a protective package on a microelectronic device, comprising:
etching at least a portion of the surface of the package to remove a layer of material from the package; and
cleaning residual materials and/or chemicals from the package after terminating the etching of the package surface.
- [c23] 23. The method of claim 22 wherein etching the package includes chemically etching at least a portion of the surface of the package with hydrofluoric acid, and wherein cleaning the package includes rinsing at least a portion of the package with de-ionized water.
- [c24] 24. The method of claim 22, wherein the package surface to be finished is positioned adjacent to an interposing substrate assembly, and wherein the method further comprises positioning a masking member at least adjacent to a portion of the interposing substrate assembly such that the portion of the package surface to be etched is not covered by the masking member.
- [c25] 25. The method of claim 22, further comprising:
controlling the depth of the etching by determining a depth at which the chemical etching will have removed sufficient blemishes from the package surface to attain a preselected surface finish and
terminating the etching at the depth where the preselected surface finish has been attained.
- [c26] 26. A method for finishing a surface of a protective package on a microelectronic device, comprising:
ablating the surface of the package to remove a layer of material from the package; and

cleaning residual materials from the package after terminating the ablation of the package surface.

[c27] 27. The method of claim 26, further comprising:
controlling the depth of ablation by determining a depth at which the ablation will have removed sufficient blemishes in the surface to attain a preselected surface finish and terminating the ablation at the depth where the preselected surface finish has been attained.

[c28] 28. The method of claim 26 wherein ablating the surface of the package comprises consuming material from the package using a laser.

[c29] 29. A method for finishing a surface of a protective package on a microelectronic device, comprising:
pressing a surface of a stamp or press having a preselected finish against at least a portion of the package surface to emboss the package surface; and
controlling the amount of embossing by determining the time required to produce a preselected uniform surface texture and terminating the embossing after the time required to produce the preselected uniform surface texture has elapsed.

[c30] 30. The method of claim 29, further comprising heating the surface of the stamp or press.

[c31] 31. A method for packaging a microelectronic device, the package having a uniformly textured and colored surface, comprising:
molding package compound at least partially around a microelectronic die to at least partially encase the microelectronic die;

abrading at least a portion of the surface of the package by engaging an abrasive media with the surface of the package; and terminating the abrasion when a surface blemish has been at least partially removed from the package.

[c32] 32. The method of claim 31 wherein the abrasive media comprises a fixed-abrasive member and abrading the surface of the package comprises pressing the surface of the package against the fixed-abrasive member and imparting motion to the package and/or the member to rub the package surface against the member.

[c33] 33. The method of claim 31 wherein the abrasive media is a non-abrasive member and a chemical solution having abrasive particles, and abrading the surface of the package comprises pressing the surface of the package against the non-abrasive member in the presence of the solution and imparting motion to the package and/or the non-abrasive member to rub the package surface against the member in the presence of the solution.

[c34] 34. The method of claim 31 wherein the abrasive media is an abrasive blasting media and abrading the surface of the package comprises driving the abrasive blasting media against the surface of the package.

[c35] 35. The method of claim 31, wherein the package is positioned adjacent to an interposing substrate assembly, and wherein the method further comprises positioning a masking member at least adjacent to a portion of the interposing substrate assembly such that the portion of the package surface to be abraded is not covered by the masking member.

[c36] 36. A method for marking a surface of a protective resin package on a microelectronic device, comprising:

abrading at least a portion of the surface of the package by engaging an abrasive media with the surface of the package;

terminating the abrasion when a surface blemish has been at least partially removed from the package; and

applying a mark to the package.

[c37] 37. The method of claim 36, further comprising:

cleaning residual materials from the package after terminating the abrasion of the package surface.

[c38] 38. The method of claim 36, wherein the microelectronic device is a microelectronic device that has been identified as having a resin package with a blemish on a primary marking surface of the package, and wherein the surface to be marked is the primary marking surface.

[c39] 39. A method for finishing protective packaging on microelectronic devices, comprising:

identifying a microelectronic device having a protective package and a surface blemish on a primary marking surface of the package; and

altering at least a portion of the surface blemish by changing the primary marking surface.

[c40] 40. The method of claim 39 wherein altering the surface blemish comprises abrading at least a portion of the primary marking surface by engaging an abrasive media with the primary marking surface.

[c41] 41. The method of claim 40 wherein the abrasive media is a fixed-abrasive member and abrading the primary marking surface comprises pressing

the surface against the fixed-abrasive member and imparting motion to the package and/or the member to rub the marking surface against the member.

[c42] 42. The method of claim 40 wherein the abrasive media is a fixed-abrasive member and a solution, and abrading the primary marking surface comprises pressing the surface of the package against the fixed-abrasive member in the presence of the solution and imparting motion to the package and/or the fixed-abrasive member to rub the package surface against the fixed-abrasive member in the presence of the solution.

[c43] 43. The method of claim 40 wherein the abrasive media is a non-abrasive member and a solution having abrasive particles, and abrading the primary marking surface of the package comprises pressing the surface against the non-abrasive member in the presence of the solution and imparting motion to the package and/or the non-abrasive member to rub the primary marking surface against the member in the presence of the solution.

[c44] 44. The method of claim 40 wherein the abrasive media is an abrasive blasting media and abrading the primary marking surface comprises driving the abrasive blasting media against the surface.

[c45] 45. The method of claim 40 wherein the primary marking surface of the package is positioned adjacent to an interposing substrate assembly, and wherein the method further comprises positioning a masking member adjacent to at least a portion of the interposing substrate assembly such that the portion of the primary marking surface to be abraded is not covered by the masking member.

[c46] 46. The method of claim 39 wherein altering the surface blemish includes etching at least a portion of the primary marking surface to remove at least a portion of the blemish.

[c47] 47. The method of claim 39 wherein altering the surface blemish includes ablating at least a portion of the primary marking surface to remove at least a portion of the blemish.

[c48] 48. The method of claim 39 wherein altering the surface blemish includes pressing a surface of a stamp or press having a preselected finish against at least a portion of the primary marking surface to emboss the primary marking surface.